US ARMY CORPS
OF ENGINEERS
NEW ENGLAND DIVISION

INVENTORY INSPECTION REPORT

WEST THOMPSON LAKE SERVICE BRIDGE
WEST THOMPSON LAKE
NORTH GROSVENORDALE, CT

August 1997

New England District

WEST THOMPSON LAKE
SERVICE BRIDGE
INVENTORY INSPECTION REPORT

TABLE OF CONTENTS

I. EXECUTIVE SUMMARY

1. PURPOSE AND SCOPE: The purpose of this inspection is to evaluate the service bridge at West Thompson Lake, North Grosvenordale, Connecticut, to detect any conditions of structural distress or operational inadequacy, and to increase the useful life and assure the continued safety of the structure.

2. AUTHORITY: The basis for this inspection is contained in ER 1110-2-111 "Periodic Safety Inspection and Continuing Evaluation of USACE Bridges," 30 April 1997.

3. REFERENCES: The field inspection and evaluation was performed in accordance with CFR 23 part 650 the "National Bridge Inspection Standard" (NBIS), the Federal Highway Administration "Bridge Inspector's Training Manual/90" dated July 1991 (revised March 1995), and the AASHTO "Manual for Maintenance Inspection of Bridges" 1983.

4. PREVIOUS INSPECTIONS: The service bridge at West Thompson Lake was last inspected in August 1996 as part of the Periodic Inspection Program for Dams and Appurtenant Structures, in accordance with ER 1110-2-100. The bridge is not located on a public road and is not technically under authority of the NBIS. However, guidance contained in ER 1110-2-111 requires all bridges owned or maintained by the United States Army Corps of Engineers be inspected in accordance with the NBIS, regardless of whether it is a public access road or not. Based on the above, as well as the overall good to excellent condition of the structure, the bridge will continue to be inspected on a 5-year cycle, coincident with the Periodic Inspections. This inspection and report is considered the initial Inventory Inspection of the service bridge at West Thompson Lake, in accordance with section 5.d. of ER 1110-2-111.

5. RECOMMENDATIONS: Replace damaged guardrail posts. Repatching delaminated concrete at the south abutment should be included in the next concrete or bridge contract at the project. Movement of bridge bearings should be checked during next 'Snooper' inspection of the West Thompson access bridge (scheduled FY 98).

II. BRIDGE DESCRIPTION AND HISTORY

The service bridge was constructed in 1963, as part of the West Thompson Lake flood control project, on the Quinebaug River in the town of North Grosvenordale, Connecticut. Appendix C contains a location map of the bridge. The bridge was constructed to provide access from the crest of the dam to the control tower, which houses the outlet works for the dam. Although the bridge is closed to public access, terminates at the gate tower, and is subject to minimal traffic, it is considered a critical structure for flood control operations at West Thompson Lake.

The bridge is 61'-1" long and is a single span. It is a composite structure with two plate girders supporting a reinforced concrete deck (photo 1). The bridge is oriented approximately 90°

from the approach road at the crest of the dam. The bridge roadway is 10'-0" wide between 1'-1" wide by 10" high curbs. Both curbs support aluminum post and pipe guard rails. The concrete deck varies in thickness from 8" at the curbs to 9" at the centerline. The plate girders are 36" deep (36 WF 160) and are spaced 7'-6" center to center. The bridge is simply supported by a concrete stub abutment at the dam crest and by two reinforced concrete haunches at the control tower.

III. DESIGN CRITERIA

Loading conditions, design assumptions and other design criteria are based on applicable parts of the Engineering Manual for Civil Works issued by the Office of the Chief of Engineers. Accepted engineering practice was employed, including AASHTO Design Specifications - 1961 Edition, in cases where the Engineering Manual for Civil Works does not apply. The live load used for design of the bridge was a standard AASHTO HS-20 truck loading. The original contract specifications called for reinforcing steel conforming to ASTM A305-50T, with a working stress of 20,000 psi. Structural steel is designed for the working stresses of ordinary bridge and building steel (minimum yield stress 33,000 psi minimum). The basic working stress is 18,000 psi for bridge steel. The concrete was specified to have a working stress of 1,200 psi and an ultimate compressive strength of 3,000 psi, minimum. Appendix C contains detailed construction drawings of the bridge.

IV. INSPECTION PROCEDURE

The field inspection of this bridge was conducted on 28 May 1997. The inspection was performed in accordance with the Federal Highway Administration "Bridge Inspector's Training Manual/90" and the AASHTO "Manual for Maintenance Inspection of Bridges" 1983, as required by ER 1110-2-111. The weather was sunny and the temperature was 75°F. The field inspection consisted of a complete visual investigation of all bridge components above ground. Hammers, probing rods, and tape measures were used. Testing and/or instrumentation of individual members was not included as part of this inspection. Color photographs were taken using a 35 mm camera and are included in Appendix A of this report.

The underside of the bridge was inspected using a Paxton-Mitchell "Snooper Mark V," which complies with ANSI /SIA A92.8-1993 for Vehicle-Mounted Bridge Inspection and Maintenance Devices. The "Snooper" is a truck-mounted, self-contained hydraulic unit from which inspection personnel can be lowered by boom to positions beneath the bridge deck while the truck carrier remains on the bridge deck. The "Snooper" provided complete access to the underside of the bridge, including the bearings and bridge seats.

A bridge inspection form was completed and is provided in Appendix B of this report. Numerical ratings are used to describe the general condition of major bridge components. The

rating system is based on that presented in the "Bridge Inspector's Training Manual/90," and is reproduced in Appendix B of this report.

V. FRACTURE CRITICAL EVALUATION

A Fracture Critical Member (FCM) is a member in tension or with a tension element, whose failure would probably cause a portion of or the entire bridge to collapse. FCMs are subject to fracture due to either brittle or fatigue failure. Brittle fracture of a steel member can be caused by the sudden application of a load which develops high total stresses at the location of a defect in the metal (i.e, nick, notch, crack) and is more likely to occur during cold weather when the steel tends to be more brittle. The formation of a fatigue crack in a steel member is caused by repeated cycles of stress due to live loads. The fatigue life of a steel bridge is dependent on the magnitude of the applied stresses, and the fatigue strength of the materials and their connection details. The FCMs on the service bridge are the steel girders. The girders are in very good condition. Therefore physical testing or evaluation of the girders is not warranted at this time, although special attention should be given them during subsequent scheduled inspections.

VI. INSPECTION RESULTS

1. APPROACH ROADWAY: The bituminous approach roadway runs along the crest of the dam and is in good condition. There is a 90° turn from the two-lane approach road to the bridge deck. The transition from the approach pavement onto the bridge deck is smooth and in good condition. Two wooden posts supporting the dam crest cable guardrail system were struck and damaged at the southeast approach (photo 2).

2. DECK: The deck is in very good condition. The concrete surface shows minor wear, and there are no cracks observed at the top surface or underside. The curbs, drains and guardrails are in very good condition. Vegetation is growing in the fixed joint adjacent to the control tower (photo 3). Utility conduits, which run the length of the deck along the exterior edges of the east and west girders, are in good condition.

3. SUPERSTRUCTURE: The expansion (located at the south, abutment end) and fixed (located at the north, control tower end) bearings are in good condition with minor corrosion (photos 4 and 5). Bolts at the expansion bearings are observed to be bent slightly towards the backwall of the abutment. The gap between the bottom of the bolt and the top of the bearing plate is as follows:

East Girder - interior bolt	3/16"	(photo 6)
- exterior bolt	ok	
West Girder - interior bolt	1/4"	(photo 7)
- exterior bolt	3/16"	

Original expansion bearings were replaced in 1985 with new sliding bearings. These new bearings may not be sliding. Bolts at the fixed bearings are also bent towards the backwall of the concrete haunch. The gap between the bottom of the bolt and the top of the bearing plate is as follows:

East Girder - interior bolt	ok	
- exterior bolt	7/16"	(photo 8)
West Girder - interior bolt	1/16"	
- exterior bolt	3/16"	

The distances between the backwall and the east and west girder ends at the south abutment were 12 3/8" (measured at interior bottom edge of girder) and 11 7/8" (measured at interior bottom edge of girder), respectively. The distances between the backwall and the east and west girder ends at the north control tower haunch were 2 5/8" (measured at interior bottom edge of girder) and 2 1/2" (measured at exterior bottom edge of girder), respectively.

The condition of the girders and diaphragms is very good. There is very little corrosion on webs, flanges and diaphragms. A fuel tank previously attached to the girders adjacent to the control tower was removed and the supporting wide flange sections were left in place.

4. SUBSTRUCTURE: The southern abutment is in good condition with minor honeycombed concrete noted at the intersection of the backwall and the bridge seat (photo 9). The concrete at the east and west corners of the abutment, where the wingwalls meet the breastwalls, was previously patched (photo 10). The west corner is in general good condition. A 4 foot by 4 foot triangular area at the east corner patch is delaminating with some efflorescence evident at the lower edge of the patch (photo 11). At the east concrete control tower haunch, which supports the steel girder, there is a 6" by 3" area of spalled concrete at the sloping lower side of the haunch. The rebar is exposed (photo 12). It appears that the rebar was originally placed with inadequate cover. Both haunches have accumulated minor amounts of debris.

5. TRAFFIC SAFETY FEATURES: The bridge is not open to the public, and only carries maintenance vehicles out to the crest of the dam. The bridge guardrail system is in very good condition. The two damaged wooden posts at the approach to the bridge pose a safety hazard.

6. CHANNEL: Not Applicable.

VII. SUMMARY

1. CONCLUSIONS: The overall condition of the bridge is good, with no signs of structural distress. The deficiencies noted are not of a serious nature and do not compromise the functional capacity or the safety of the bridge.

2. RECOMMENDATIONS: Replace damaged guardrail posts. Repatching delaminated concrete at the south abutment should be included in the next concrete or bridge contract at the project. Movement of bridge bearings should be checked during next 'Snooper' inspection of the West Thompson access bridge (scheduled FY 98).

VIII. LOAD RATING ANALYSIS

The bridge is rated in accordance with the AASHTO "Manual for Maintenance Inspection of Bridges" 1983. The ratings are calculated at two stress levels, as defined below:

1. INVENTORY RATING: The first (lower) rating is referred to as the Inventory Rating. The Inventory Rating is the load (associated with the particular vehicle type being rated), which can safely be carried by the structure for an indefinite period of time. A special permit is required for all vehicles heavier than the Inventory Rating. These vehicles are called "Permit Loads."

2. OPERATING RATING: The second (upper) rating is referred to as the Operating Rating. The Operating Rating is the absolute maximum permissible load (associated with the particular vehicle type being rated) to which a structure may be subjected. Permit loads, as described above, must be distributed such that the structural capacity, as determined by the Operating Rating, is not exceeded.

3. LOAD RATING RESULTS: The live load used in determining both the Inventory and Operating Ratings is the standard AASHTO type HS-20 vehicle. Because the bridge is narrow and is aligned 90° from the west approach, it was assumed that all traffic crossing the bridge would be traveling slowly, and therefore impact loading was not included in the analysis. Each member of the bridge was analyzed for both Inventory and Operating Ratings. Load rating calculations are provided in Appendix D of this report. Results of the load rating analysis are as follows:

	RATING IN TONS	
VEHICLE TYPE	**INVENTORY**	**OPERATING**
HS-20	**41.20**	**68.60**

The inventory and rating is limited by the capacity of the girders. The operating rating is limited by the capacity of the deck.

APPENDIX A

PHOTOGRAPHS

Photo 1: West Thompson Lake Service Bridge

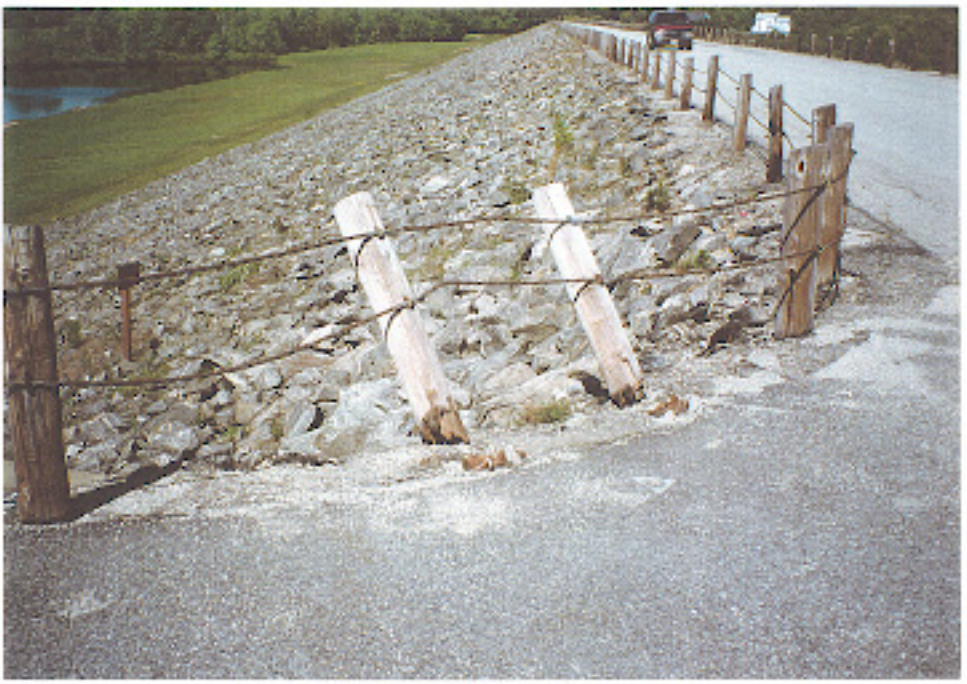


Photo 2: Damaged Posts at the Southeast Approach

Photo 3: Vegetation at the North Control Tower Deck Joint

Photo 4: Expansion Bearings at the South Abutment

Photo 5: Fixed Bearings at the Control Tower Haunches

Photo 6: Bent Interior Bolt at the Southeast Girder End

Photo 7: Bent Interior Bolt at the Southwest Girder End

Photo 8: Bent Exterior Bolt at the Northeast Girder End

Photo 9: Honeycomb at the South Abutment Backwall

Photo 10: Concrete Patches at the South Abutment

Photo 11: Delamination and Efflorescence at the Southeast Wingwall

Photo 12: Spall at the Northeast Control Tower Haunch

APPENDIX B

BRIDGE INSPECTION FORMS

CONDITION RATING GUIDELINES

The following numerical rating guidelines are taken from the "Bridge Inspector's Training Manual/90," and are used to report the condition of different bridge components.

Code	Description
N	NOT APPLICABLE
9	EXCELLENT CONDITION
8	VERY GOOD CONDITION -No problems noted.
7	GOOD CONDITION - Some minor problems noted.
6	SATISFACTORY CONDITION - Structural elements show some minor deterioration.
5	FAIR CONDITION - All primary structural elements are sound, but may have minor section loss, cracking, spalling or scour.
4	POOR CONDITION - Advanced section loss, deterioration, spalling or scour.
3	SERIOUS CONDITION - Loss of section, deterioration, spalling or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel, or sheer cracks in concrete, may be present.
2	CRITICAL CONDITION - Advanced deterioration of primary structural elements. Fatigue cracks in steel, or sheer cracks in concrete, may be present, or scour may have removed substructure support. Unless closely monitored, it may be necessary to close the bridge until corrective action is taken.
1	"IMMINENT" FAILURE CONDITION - Major deterioration or section loss present in critical structural components, or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic, but corrective action may put the bridge back in light service.
0	FAILED CONDITION - Out of service and beyond corrective action.

STRUCTURES INSPECTION FIELD REPORT

ROUTINE INSPECTION

ity/town	bridge dept. no.	8-structure no.	90-date inspected
North Greenwich CT			28 May 1997

7-dist.	104-highway system	22-owner	27-year built	106-year rebuilt	11-milepoint
	0 - Not on NHS	US Army Corps Engrs	1963	—	—

43-structure type: 302 - Steel Plate Girder	quality control engineer: Nick Forbes
07-facility carried: Access Road to Control Tower	team leader: Joe Colucci
06-features intersected: Upstream Embankment - Dam	team members: Laureen Borochaner

item 58	8
DECK	
1. Wearing Surface	8
2. Deck-Condition	8
3. Stay in Place Forms	N
4. Curbs	8
5. Median	N
6. Sidewalks	N
7. Parapet	8
8. Railing	8
9. Anti Missile Fence	N
10. Drains	8
11. Lighting Standards	N
12. Utilities	8
13. Deck Joints	7
14. Approach Settlement	8

item 59	8
SUPERSTRUCTURE	
1. Bearing Devices	7
2. Stringers	N
3. Diaphragms	8
4. Girders or Beams	8
5. Floor Beams	N
6. Trusses	N
7. Rivets or Bolts	N
8. Welds	8
9. Collision Damage	N
10. Load Deflection	8
11. Member Alignment	8
12. Load Vibration	8
13. Paint-Epoxy	8
14. Year Painted	—
15. Under Clearance ____ ft ____ in	
Clearance Signs ☐ yes ☑ no	

item 60	7
SUBSTRUCTURE	
1. Abutments	
a-Wings	7
b-Backwall	7
c-Bridge Seats	8
d-Breastwall	7
e-Footings	N
f-Piles	N
g-Erosion	N
h-Settlement	8
2. Piers or Bents	
a-Caps	N
b-Column	N
c-Web	N
d-Footing	N
e-Piles	N
f-Scour	N
g-Settlement	N
3. Collision Damage	N
4. Hydraulic-Adequacy	N

Actual Posting	H	3	3S2	Single
	N	N	N	☐
Recommended Posting From Rating Book	☐	☐	☐	☐

SIGNS IN PLACE Y or N	at bridge	advance
	N	N
LEGIBILITY	☐	☐

Overhead Signs (attached to bridge) ☐ yes ☑ no

1. Welds	☐
2. Bolts	☐
3. Condition	☐

Item93b U/W Inspection Date: ____

ITEM 61-channel and channel protection: N

1. channel scour	☐	5. rip rap or slope paving	☐
2. embankment erosion	☐	6. effectiveness	☐
3. fender system	☐	7. debris	☐
4. spur dikes & jetties	☐	8. vegetation	☐

36-Traffic Safety features

	36	condition
1. bridge railing	1	8
2. transitions	N	—
3. approach guardrail	0	3
4. guardrail terminal	N	—

X=UNKNOWN NA=NOT APPLICABLE IA=INACCESSIBLE

HIGHWAY BRIDGE STRUCTURE INVENTORY AND APPRAISAL 01/20/98

********** IDENTIFICATION **********
1 State - Connecticut 091
200 COE MSC -NORTH ATLANTIC
201 COE District -DIS/DIV IS UNDEFINED.
202 COE Bridge Number : CENNEDCT0910012
8 STRUCTURE NUMBER : CENNEDCT0910012
5 Inventory Route -on 168000000
2 Highway Dist. : 00
3 County Code:000 4 Place code:
6 Features Intrsct:ACCESS ROAD TO DAM
7 Facility Carried:GATEHOUSE ACCESS
9 Location : NORTH GROSVENORDALE, CT
11 Milepoint : .
16 Lat:41D 56.0' 17 Long:071D 53.3'
98 Border Br State :
99 Border Br Stru #:

****** STRUCTURE TYPE & MATERIAL ******
43 Stru Main Material- Steel
Type- Stringer/Multibeam/Girder 302
44 Stru App Material- Other
Type- Other 000
45 # of Main Spans : 001
46 # of App Spans : 0000
107 Deck Stru -Concrete CIP 1
108 Wearing Surf/Protective Sys type
A Wearing Surface - Concrete 1
B Membrane - None 0
C Deck Protection - None 0

********** AGE & SERVICE **********
27 Year Built : 1963
106 Year Reconstructed :
42 Type of Service on -Highway
under: Other 10
28 Lanes On Stru: 01 Under Stru: 00
29 ADT : 000005
30 Yr of ADT : 97 109 Truck ADT : 00%
19 Bypass, Detour Length (miles) 99

********** GEOMETRIC DATA **********
48 Length of Max Span (ft) : 0060
49 Structure Length (ft) : 000061
50 Curb/Sidewalk Width L:01.1' R:01.1'
51 Bridge Width, Curb-to-Curb : 010.0'
52 Deck Width, out-to-out : 012.2'
32 Approach Rdwy Width : 010'
33 Bridge median - No median 0
34 Skew : 00 deg 35 Stru Flared: 0
10 Inventory Rt Min Vert Clrn : 99'99"
47 Inv. Rt Total Horz Clrn : 10.0'
53 Min Vert Clrn over Rdwy : 99'99"
54 Min Vert Underclearance :N00'00"
55 Min Lateral R Underclrnc : N99'9"
56 Min Lateral L Underclrnc : 99'9"

Bridge record was updated on : 11/06/97

(App C) Sufficiency Rating = 076.0
Status = Functional obselete

******* NAVIGATION DATA *******
38 Navigation Control :N
111 Pier/Abutment Protection:
39 Navigation Vert Clrn : 000'
116 Vert Lift Bridge Min Clr: '
40 Navigation Horz Clrn :0000'

********* CLASSIFICATION *********
112 NBIS Bridge Length : Y
104 Hwy System of Inventory Rt: 0
26 Functional Classification : 06
100 Defense Hwy Designation : 0
101 Parallel Stru Designation : N
102 Direction of Traffic : 3
103 Temperary Stru Designation:
110 Designated Natl Network : 0
20 Toll : 3
21 Main - Military/Corps : 70
22 Owner- Military/Corps : 70
37 Historical Significance : 5

********** CONDITIONS **********
58 Deck : 8
59 Superstructure : 8
60 Substructure : 7
61 Channel Protection : N
62 Culverts : N

****** LOAD RATING & POSTING ******
31 Design Load - HS 20 : 5
64 Operating Rating : 269
66 Inventory Rating : 241
70 Posting - Unknown : 5
41 Stru Open/Posted/Closed : B
- Open, posting recommended

********** APPRAISAL **********
67 Structure Evaluation : 7
68 Deck Geometry : 6
69 Underclearance Vert/Horz : N
71 Waterway Adequacy : N
72 Approach Roadway Alignmen : 3
36 Traffic Safty Features :1N0N
113 Scour Critical Bridges : N

****** PROPOSED IMPROVEMENTS *****
75 Type of Work : 000
76 Length of Stru Imprvmt : 000000
94 Bridge Improvement Cost: 000000
95 Roadway Imprvmnt Cost : 000000
96 Total Project Cost (K) : 000000
97 Yr of Imprvmnt Cost Est: 00
114 Future ADT : 000000
115 Year of Future ADT :

********** INSPECTION **********
90 Insp Date: 05/97 91 Freq: 24mo
92 Critical Feature Insp 93 Date
A Frac. Crit Detail :Y 24 /
B Underwater Insp : /
C Other Special Insp: /
203 Insp Off -DIS/DIV IS UNDEFINED.
204 Inspector:JOE COLUCCI
205 Insp Cost:

1	State (091)	-	Connecticut
200	COE MSC	-	NORTH ATLANTIC
201	COE District	-	DIS/DIV IS UNDEFINED.
202	COE Bridge Number	:	CENNEDCT0910012
8	STRUCTURE NUMBER	:	CENNEDCT0910012
211	MACON	:	
212	Installation Name	:	
213	Military Load Class Wheeled	:	
214	Military Load Class Tracked	:	
215	Installation Number (IFS)	:	
216	Seismic Category	:	
217	Acceleration Coefficient	:	
218	Soil Site Condition	:	

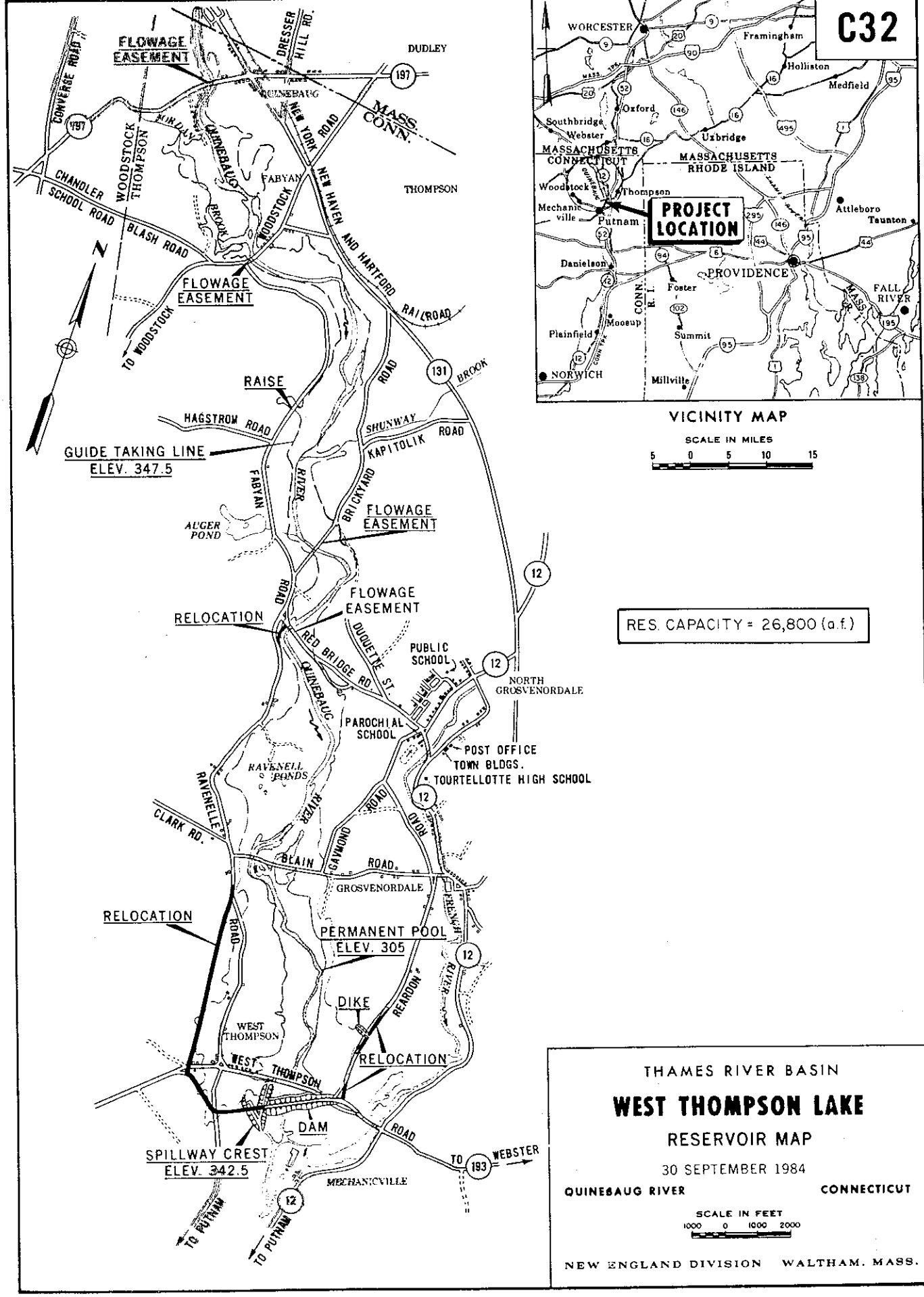
APPENDIX C

LOCATION MAP & DETAILED DRAWINGS

CORPS OF ENGINEERS

U.S. ARMY

C32



VICINITY MAP

SCALE IN MILES

5 0 5 10 15

RES. CAPACITY = 26,800 (a.f.)

THAMES RIVER BASIN

WEST THOMPSON LAKE

RESERVOIR MAP

30 SEPTEMBER 1984

QUINEBAUG RIVER — CONNECTICUT

SCALE IN FEET

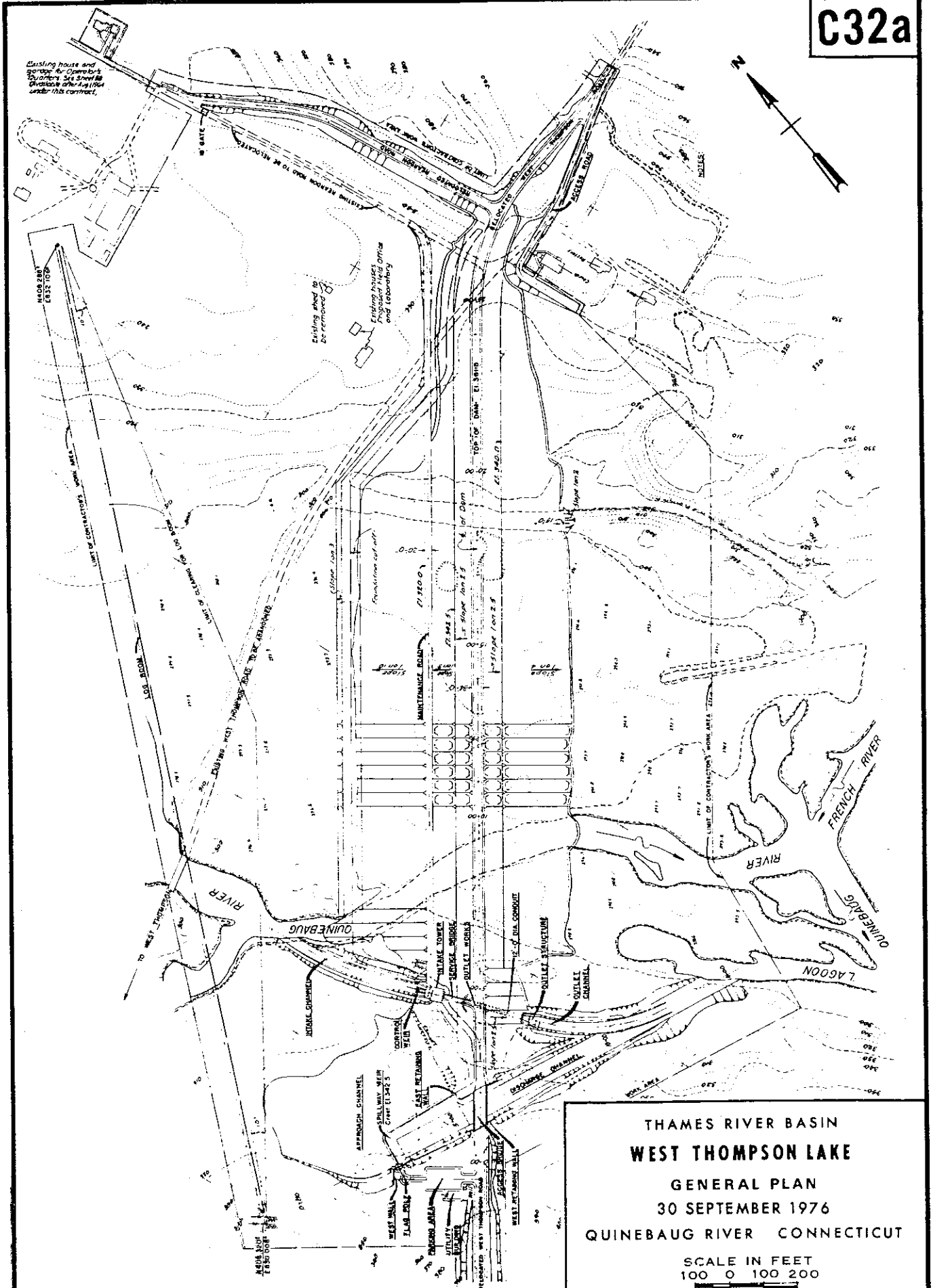
1000 0 1000 2000

NEW ENGLAND DIVISION WALTHAM, MASS.

CORPS OF ENGINEERS

U.S. ARMY

C32a



THAMES RIVER BASIN

WEST THOMPSON LAKE

GENERAL PLAN

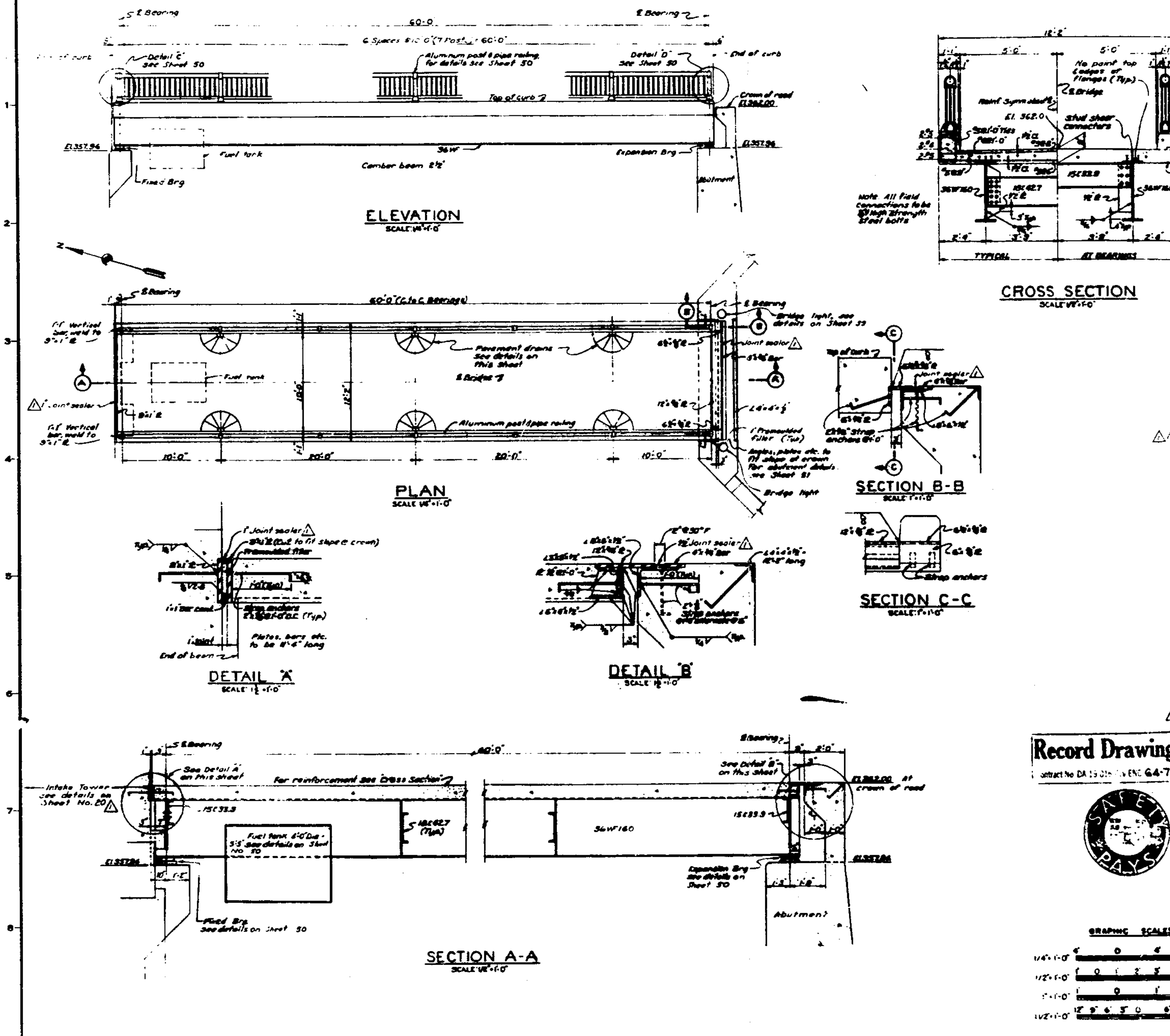
30 SEPTEMBER 1976

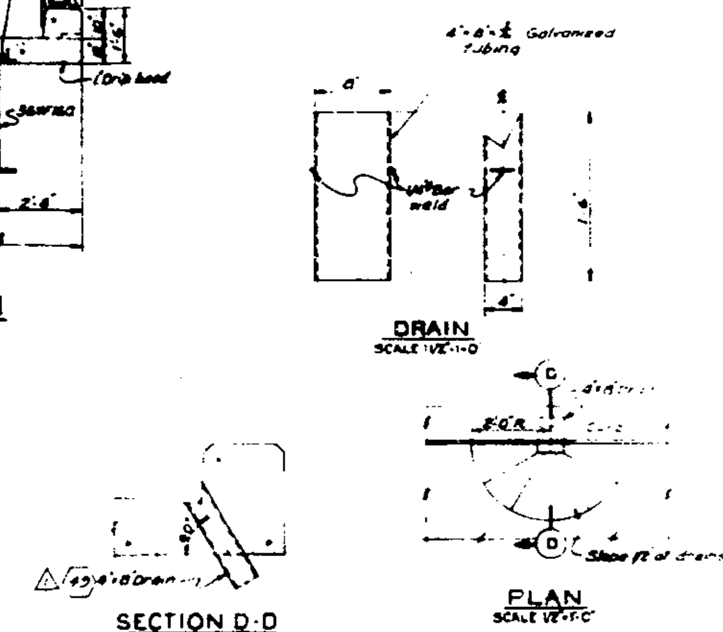
QUINEBAUG RIVER CONNECTICUT

SCALE IN FEET

100 0 100 200

NEW ENGLAND DIVISION WALTHAM, MASS.





PAVEMENT DRAIN DETAILS

GENERAL NOTES

1. Design specifications: Standard Specifications for Highway Bridges (AASHO-1961) supplemented by the Connecticut State Highway Dept Bridge Manual July 1961
2. Live load: Access Bridge = H20-S16-44 & Service Bridge = H20-44
3. Design soil pressure: 5000 lbs. per sq ft for Service Bridge Abutment
4. Elevations refer to Mean Sea Level Datum
5. Composite construction. No temporary intermediate supports shall be used during the pouring and setting of the concrete deck slab. Temporary supports may be used for structural steel erection only. Live and superimposed dead loads shall be permitted when directed by the Contracting Officer but not less than 10 days after the slab has been poured
6. Bar splices shall lap 24 diameters of the smaller bar except as shown otherwise
7. Fill material in front of abutment and wingwalls shall be carried up to grade at the same time as fill material is deposited at the back of the same
8. All exposed edges shall be beveled except as noted or dimensioned otherwise.
9. Future Paving allowance: 25# per sq ft on Access Bridge
10. Embankment shall be completed to normal lines to El. prior to construction of Service Bridge Abutment
11. Fill or backfill material shall be placed to portion of bridge abutment above El 357.96.

PAYMENT ITEM NUMBERS

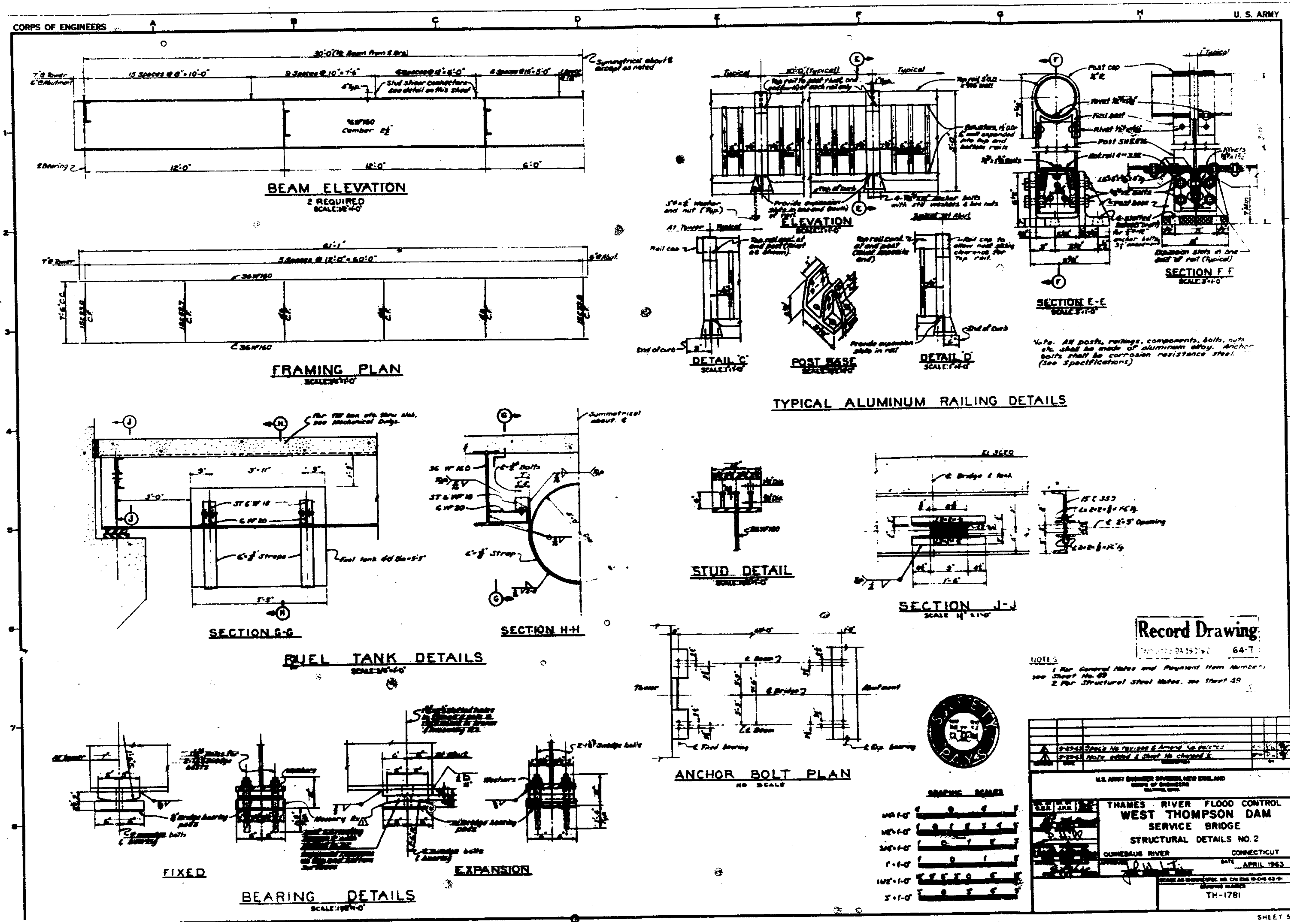
Concrete — Service Bridge Abutment — Item No. 36
Concrete — Bridge Superstructures — Item No 37
Cement — Item No. 38
Steel reinforcement — Item No 39
Structural steel — Service Bridge — Item No 49
Structural steel — Access Bridge — Item No 50
Metal bridge rail — Item No. 51

Symbol	Date	Description
△	5-29-63	Specs Note revised & Amend No 36 etc
△	5-29-63	Note & item no added & notes revised

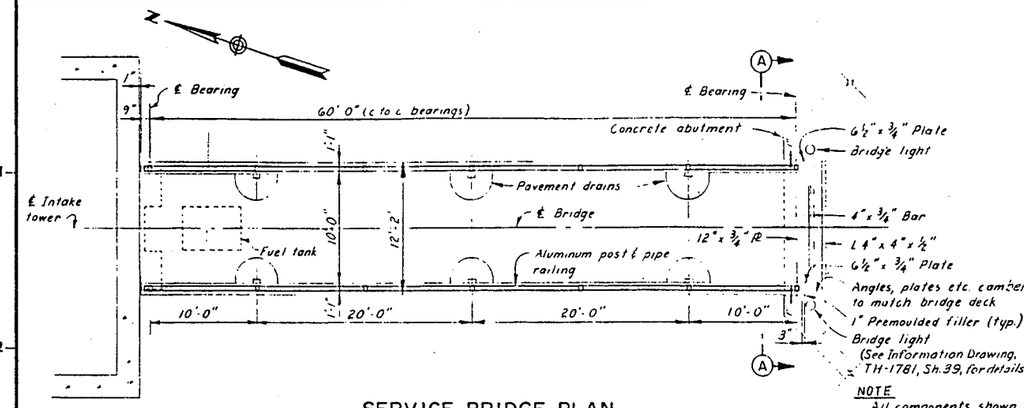
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

THAMES RIVER FLOOD CONTROL
WEST THOMPSON DAM
SERVICE BRIDGE
STRUCTURAL DETAILS NO 1
QUINEBAUG RIVER — CONNECTICUT

DATE APRIL 1963
SCALE AS SHOWN — SPEC NO. CIV ENG 9-016-63-9
DRAWING NUMBER TH-1781

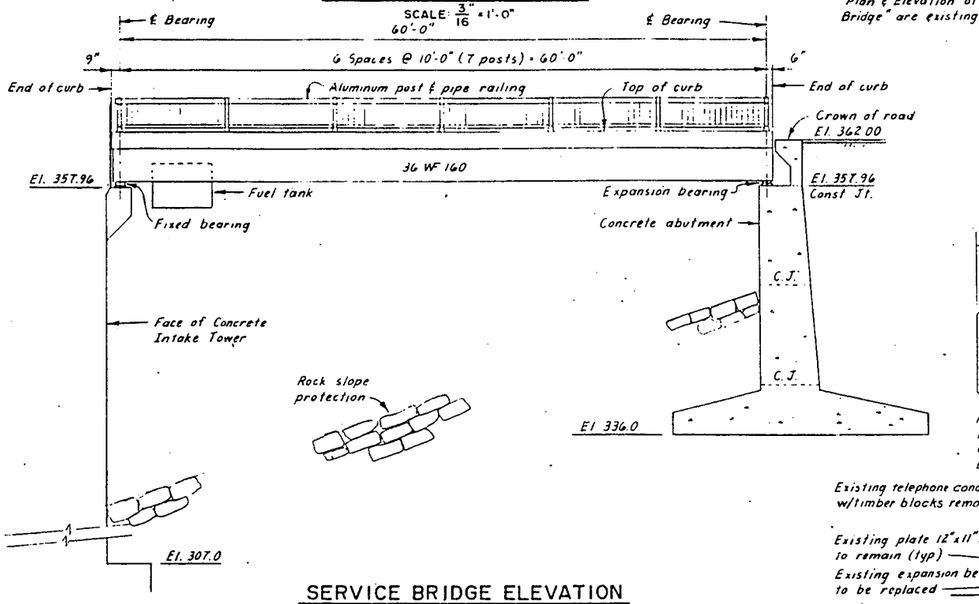


CORPS OF ENGINEERS — U. S. ARMY



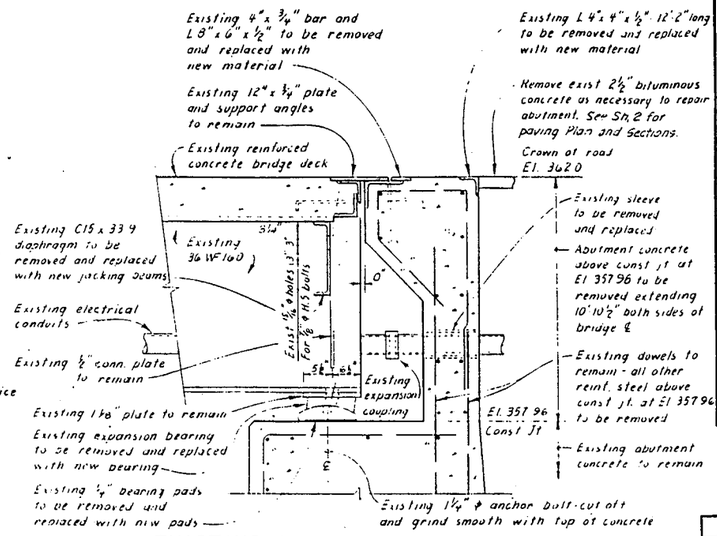
SERVICE BRIDGE PLAN

SCALE: 3/16" = 1'-0"



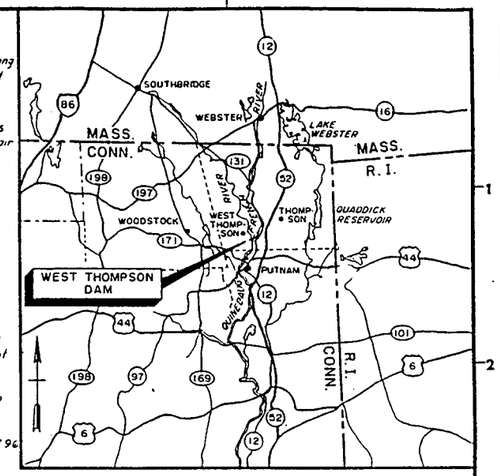
SERVICE BRIDGE ELEVATION

SCALE 3/16" = 1'-0"



EXISTING ABUTMENT DETAIL

SCALE: 1" = 1'-0"



LOCATION MAP

SCALE IN MILES

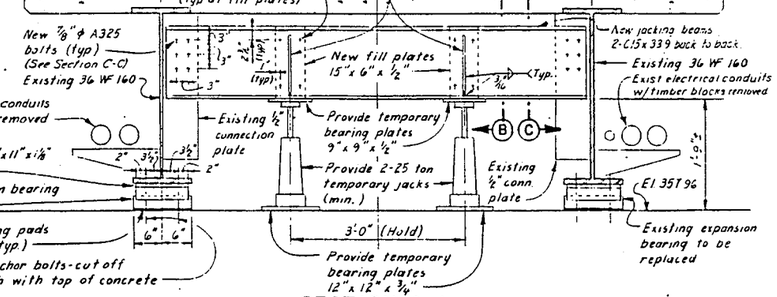
5 4 3 2 1 0 5 MI

INDEX TO DRAWINGS

DRAWING NO	SH. NO.	TITLE
THA-58	1	PLAN, ELEV., SECTIONS, DETAIL & INDEX
THA-58	2	PLAN, SECTION AND DETAILS
INFORMATION DRAWINGS		
TH-1781	39	INTAKE TOWER ELECTRICAL PLAN & DETAILS
" "	49	SERVICE BRIDGE - STRUCTURAL DETAIL NO 1
" "	50	SERVICE BRIDGE - STRUCTURAL DETAIL NO. 2
" "	51	SERVICE BRIDGE - ABUTMENTS STEEL REINF.
" "	53	ELECT DISTRIBUTION SYSTEM-PLAN & DETAILS

NOTES:

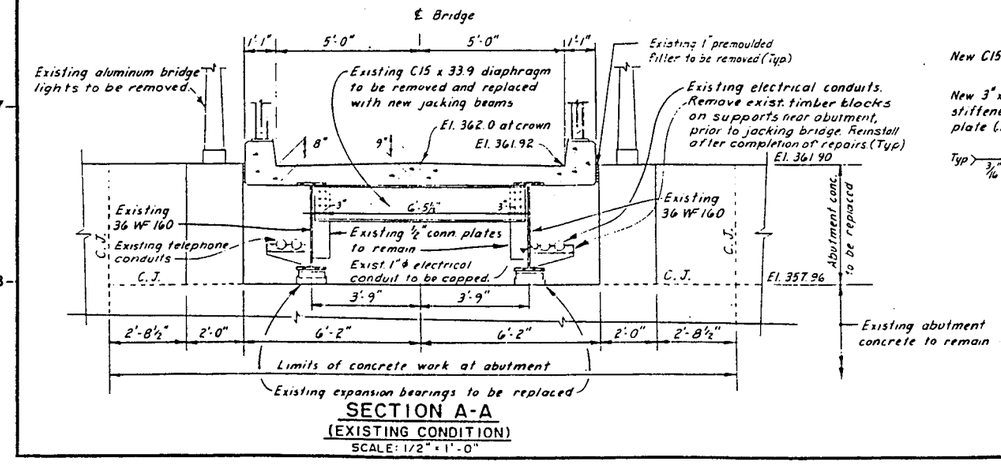
1. Work to be accomplished under this contract consists of replacing the two expansion bearings, rebuilding that portion of the abutment above El. 357.96 between the limits shown, and repaving the bituminous concrete roadway adjacent to the abutment.
2. The removal of existing concrete at the abutment and installation of new jacking beams shall be completed prior to jacking.
3. Contractor shall submit jacking equipment and procedure for approval by Contracting Officer.
4. For painting of miscellaneous steel items, see Contract Specifications.
5. See Contract Specifications for procedures for handling existing wire in electrical conduits.
6. Contractor shall verify dimensions in the field prior to fabrication of new material.



SECTION A-A

(CONDITION DURING JACKING OPERATION)

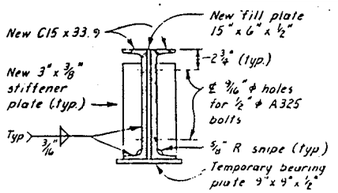
SCALE: 1" = 1'-0"



SECTION A-A

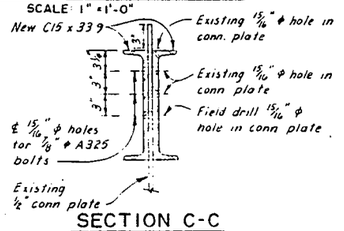
(EXISTING CONDITION)

SCALE: 1/2" = 1'-0"



SECTION B-B

SCALE: 1½" = 1'-0"



SECTION C-C

SCALE: 1½" = 1'-0"

GRAPHIC SCALES

3/16" = 1'-0" 6' 0 6'

½" = 1'-0" 1' 0 1' 2' 3' 4' 5'

1" = 1'-0" 1' 0 1' 2'

1½" = 1'-0" 12" 9" 6" 3" 0 6" 12"

As Built Drawing

Contract No. DACW33-85-C-0039

REVISION	DATE	DESCRIPTION	BY
	12 TO 86	Final field corrections	

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS

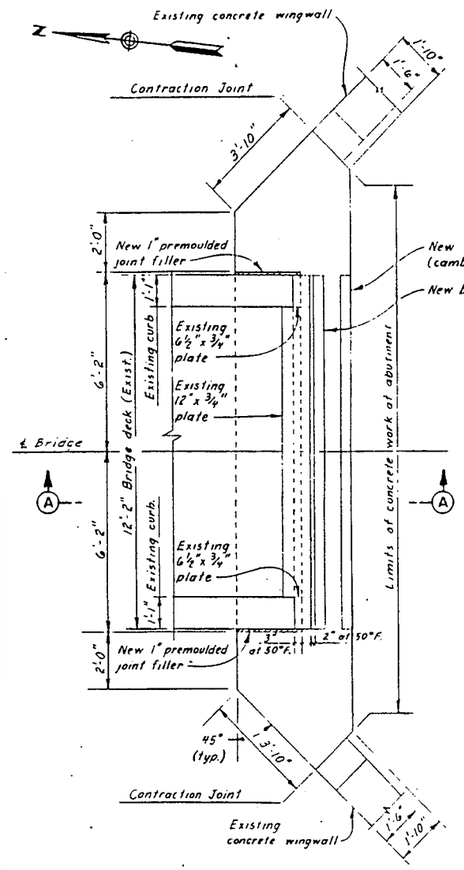
DES BY	CH BY	CK BY
D.D	S.W.K.	D.K.D

SUBMITTED 12/11/84 — CHIEF, GEN'L ENG'G SECTION
APPROVAL RECOMMENDED — CHIEF, DESIGN BRANCH
REVIEWED — PROJECT MANAGER
APPROVAL RECOMMENDED — CHIEF, PROJECT MNGT BRANCH

WATER RESOURCES DEVELOPMENT PROJECT
THAMES RIVER BASIN
WEST THOMPSON DAM
SERVICE BRIDGE - REPLACEMENT OF EXPANSION BEARINGS & ABUT. REPAIRS
PLAN, ELEV., SECTIONS, DETAIL & INDEX
QUINEBAUG RIVER CONNECTICUT

APPROVED — CHIEF, ENGINEERING DIVISION — DATE MARCH 1985

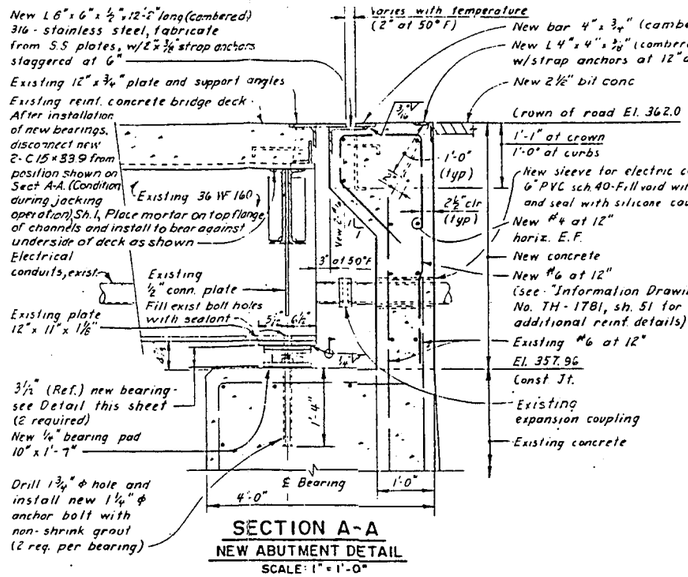
SCALE AS SHOWN | SPEC NO DACW33-85-B-0032
DRAWING NUMBER
THA-58
SHEET 1



PLAN - NEW EXPANSION JOINT

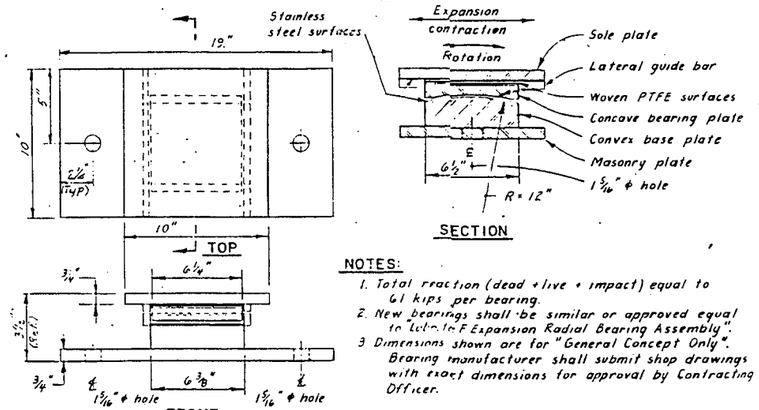
SCALE: 1/2" = 1'-0"

NOTE:
For new Bit. Conc. pavement see paving plan this sheet.



SECTION A-A
NEW ABUTMENT DETAIL

SCALE: 1" = 1'-0"



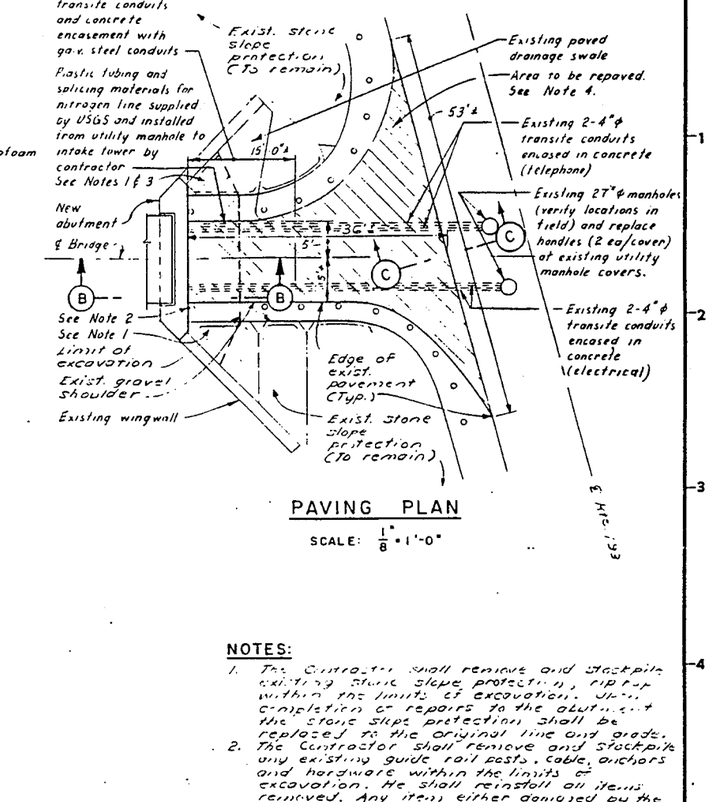
SECTION

FRONT

NEW BEARING DETAILS

SCALE: 3" = 1'-0"

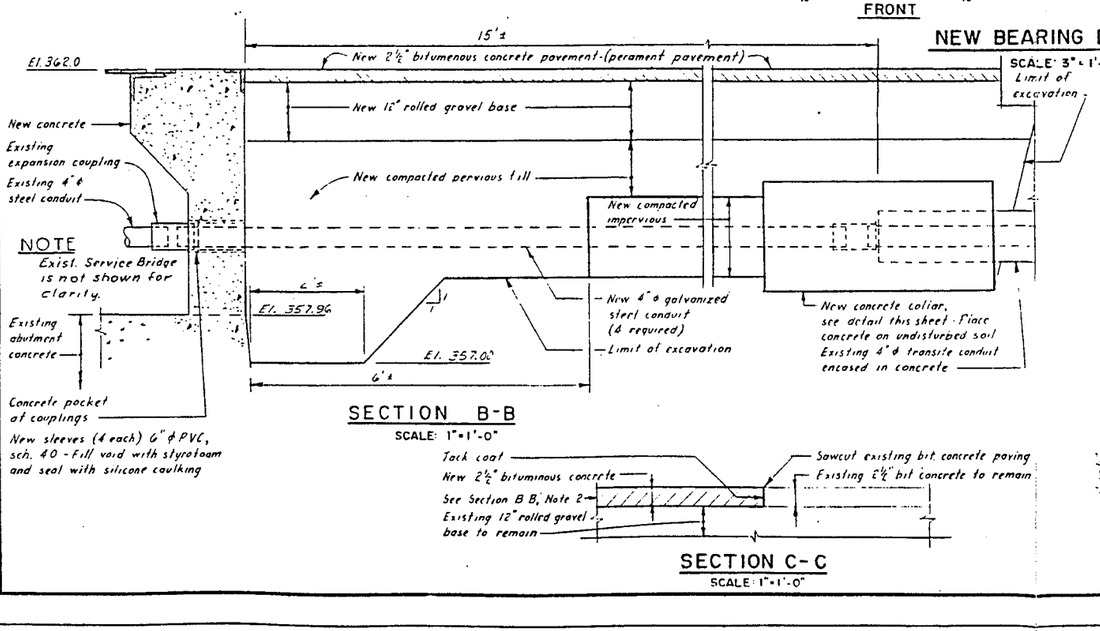
NOTES:
1. Total reaction (dead + live + impact) equal to 61 kips per bearing.
2. New bearings shall be similar or approved equal to "Lotte Type F Expansion Radial Bearing Assembly".
3. Dimensions shown are for "General Concept Only". Bearing manufacturer shall submit shop drawings with exact dimensions for approval by Contracting Officer.



PAVING PLAN

SCALE: 1/8" = 1'-0"

NOTES:
1. The Contractor shall remove and stockpile existing stone slope protection, rip-rap within the limits of excavation. Upon completion of repairs to the abutment the stone slope protection shall be replaced to the original line and grade.
2. The Contractor shall remove and stockpile any existing guide rail posts, cable, anchors and hardware within the limits of excavation. He shall reinstall all items removed. Any item either damaged by the Contractor or not reusable shall be replaced with a new item compatible with the remaining component.
3. The Contractor shall remove that portion of the paved drainage swale within the limits of excavation. He shall reconstruct and repave the drainage swale to match the existing.
4. Within the limits shown, remove the exist 2 1/2" bit conc pavement to the extent possible, do not disturb the exist 12" rolled gravel base. Fine grade and compact the existing rolled gravel base prior to placing the new 2 1/2" bit. conc. pavement.
5. Replace existing transite conduits and concrete encasement for 15'± length behind abutment with steel conduits
6. Provide new cable and nitrogen line in conduits from handholes to Intake Tower Coordinate with telephone company. Coordinate with U.S.G.S. for replacement of nitrogen line.
7. Provide new concrete collars: f_c = 2500 psi
8. Provide new reinforcement for concrete collars: f_y = 40 ksi.
9. New "Steel to Transite" conduit fittings shall be "Carlo TF-450" By Hercules Inc. or approved equal.
10. Replace Electric Service Cables with 3-#2 XHHW(CU) and 1-#2 bare ground (CU); Splice new cables at utility manhole with "Scotch" splice kit.

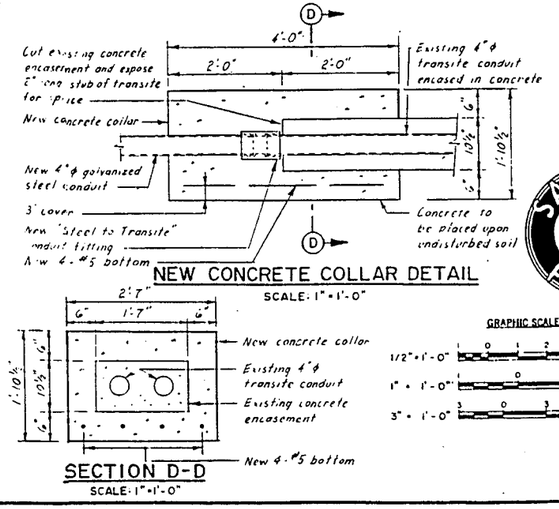


SECTION B-B

SCALE: 1" = 1'-0"

SECTION C-C

SCALE: 1" = 1'-0"



NEW CONCRETE COLLAR DETAIL

SCALE: 1" = 1'-0"

SECTION D-D

SCALE: 1" = 1'-0"

GRAPHIC SCALES

1/2" = 1'-0"
1" = 1'-0"
3" = 1'-0"

As Built Drawing
Contract No. DACW 33 85 C 0039

SAFETY PAYS

REVISION	DATE	DESCRIPTION	BY
	6-20-86	Final field corrections	

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS

DES BY	DR BY	CK BY
D.D.	SWK	D.R.D

SUBMITTED
CHIEF, GEN ENG SECTION
APPROVAL RECOMMENDED
CHIEF, DESIGN BRANCH
REVISED
PROJECT MANAGER
APPROVAL RECOMMENDED
CHIEF, PROJECT MGMT BRANCH

WATER RESOURCES DEVELOPMENT PROJECT
THAMES RIVER BASIN
WEST THOMPSON DAM
SERVICE BRIDGE - REPLACEMENT OF EXPANSION BEARINGS & ABUT. REPAIRS
PLANS, SECTIONS AND DETAILS
QUINEBAUG RIVER CONNECTICUT

APPROVED
CHIEF, ENGINEERING DIVISION
DATE MARCH 1985

SCALE: AS SHOWN | SPEC NO DACW33-85-B-0032
DRAWING NUMBER
THA-58
SHEET 2

APPENDIX D

LOAD RATING CALCULATIONS

RATING ANALYSIS

West Thompson Service Bridge
West Thompson Dam
North Grosvenordale, CT

August 1997

RATING SUMMARY TABLE

	INVENTORY (TONS)	OPERATING (TONS)
DECK	**41.20**	**68.60**
GIRDERS	45.28	80.33

RATING ANALYSIS

West Thompson Service Bridge

ELASTIC SECTION MODULI

A. STEEL GIRDER

GEOMETRY

	Width (in)	Height (in)
Top Flange	12.00	1.00
Web	0.69	34.00
Bottom Flang	12.00	1.00

SECTION PROPERTIES

	Area (in2)	y (in)	Ay	dy	A(dy)2	Ix (in4)
Top Flange	12.00	35.50	426.00	17.50	3675.00	1.00
Web	23.38	18.00	420.75	0.00	0.00	2251.79
Bottom Flang	12.00	0.50	6.00	-17.50	3675.00	1.00
TOTAL	**47.38**		**852.75**		**7350.00**	**2253.79**

CALCULATIONS

Moment Arm,	
Y = Ay/A =	18.00 in
Moment of Inertia,	
I total = Ix + A(dy)2 =	9603.79 in4
Section Modulus,	
S top = I total/Y top =	533.54 in3
S bottom = I total/Y bot =	533.54 in3

B. COMPOSITE GIRDER

GEOMETRY

Concrete Slab Thickness (in)	8.00
Effective Flange Width (in) *	73.00
Modulus Elasticity Ratio, n #	10.00

* LRFD Part 4, Composite Sections, p. 4-6

\# AASHTO Standard Specifications for Highway Bridges, 10.38.1.3 and .4

SECTION PROPERTIES

	Area (in2)	y (in)	Ay	dy	A(dy)2	Ix (in4)
Steel	47.38	18.00	852.75	-11.59	6368.65	9603.79
Concrete	58.40	39.00	2277.60	9.41	5166.35	311.47
TOTAL	**105.78**		**3130.35**		**11535.00**	**9915.26**

CALCULATIONS

Moment Arm,		
Y = Ay/A =	29.59	in
Moment of Inertia,		
I total = Ix + A(dy)2 =	21450.26	in4
Section Modulus,		
S conc = I total/Yconcrete	1600.10	in3
S top = I total/Y top =	3348.68	in3
S bottom = I total/Y bot =	724.81	in3

C. COMPOSITE GIRDER - CREEP

GEOMETRY

Concrete Slab Thickness (in)	8.00
Effective Flange Width (in) *	73.00
Modulus Elasticity Ratio, n #	30.00

* LRFD Part 4, Composite Sections, p. 4-6

\# AASHTO Standard Specifications for Highway Bridges, 10.38.1.3 and .4

SECTION PROPERTIES

	Area (in2)	y (in)	Ay	dy	A(dy)2	Ix (in4)
Steel	47.38	18.00	852.75	-6.12	1772.05	9603.79
Concrete	19.47	39.00	759.20	14.88	4312.55	103.82
TOTAL	**66.84**		**1611.95**		**6084.60**	**9707.61**

CALCULATIONS

Moment Arm,		
Y = Ay/A =	24.12	in
Moment of Inertia,		
I total = Ix + A(dy)2 =	15792.22	in4
Section Modulus,		
S conc = I total/Yconc =	836.27	in3
S top = I total/Y top =	1328.86	in3
S bottom = I total/Y bot =	654.85	in3

STRESS ANALYSIS

GIRDER LOADS (kip-ft)

Dead Load Moment (from page D7)	369.40
Superimposed Dead Load Moment (from page D7)	70.60

ALLOWABLE STRESSES **

fc (compression)	1.20 ksi
fc - operating	1.90 ksi
fs - inventory	18.00 ksi
fs - operating	24.50 ksi

** AASHTO Manual for Maintenance Inspection of Bridges, Tbls. 5.4.2 A and B, 5.4.5

DEAD LOAD STRESS - STEEL GIRDER

f top=M/S=369.4(12) / 533.5	8.31 ksi
f bot = 369.4 (12) / 533.54 =	8.31 ksi

SUPERIMPOSED DEAD LOAD STRESSES - COMPOSITE GIRDER

f c=70.60(12)/836.27(30) =	0.03 ksi
f top =70.60 (12) /1328.86 =	0.64 ksi
f bot =70.60 (12) /654.85 =	1.29 ksi

AVAILABLE LIVE LOAD STRESSES - INVENTORY

f conc = 1.2 - 0.03 =	1.17 ksi
f top = 18 - 8.31 - 0.64 =	9.05 ksi
f bot = 18 - 8.31 - 1.29 =	8.40 ksi

AVAILABLE LIVE LOAD STRESSES - OPERATING

f conc = 1.9 - 0.03 =	1.87 ksi
f top = 24.5 - 8.31 - 0.64 =	15.55 ksi
f bot = 24.5 - 8.31 - 1.29 =	14.90 ksi

AVAILABLE LIVE LOAD MOMENTS - INVENTORY

M conc = 1.17(1160)10/12 =	1555.07 ksi
M top =	2526.65 ksi
M bot =	507.25 ksi

AVAILABLE LIVE LOAD MOMENTS - OPERATING

M conc = 1.87(1160)10/12 =	2488.46 ksi
M top =	4340.52 ksi
M bot =	899.85 ksi

Distribution Factor = 0.50

Distributed Maximum Moment, *
M max = DFx M live load = 403.25 k-ft

INVENTORY RATING

Moment Available for Live Load x Wt. of HS20 Truck =
Moment Actual due to HS20 Loading

507.25 k-ft x 36 ton = **45.28 ton**
403.25 k-ft

OPERATING RATING

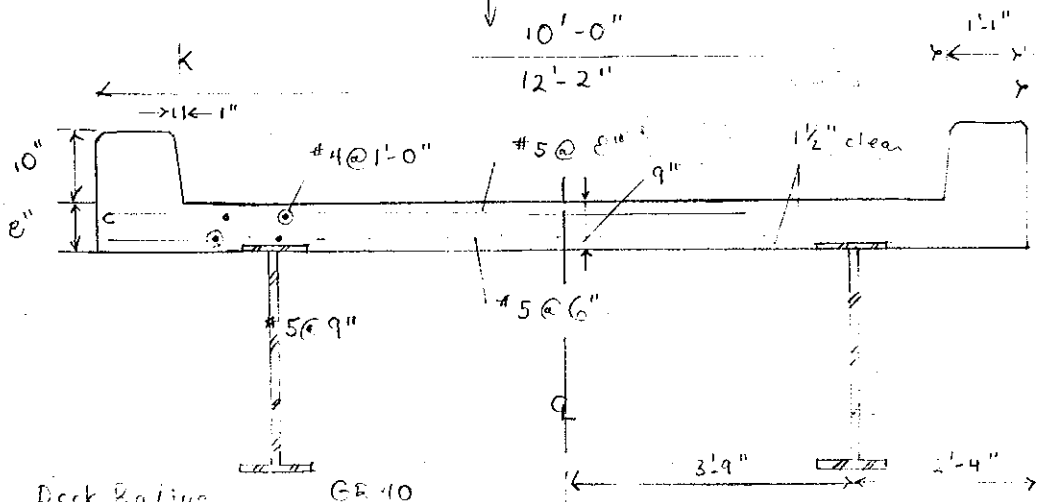
899.85 k-ft x 36 ton = **80.33 ton**
403.25 k-ft

* AASHTO Standard Specification for Highway Bridges, Appendix A

SUBJECT W. Thompson Servicd Bridge

COMPUTATION Bridge Rating Analysis

COMPUTED BY L.B. CHECKED BY gwh DATE 11/7/24



Deck Rating = GE 10 Reinforcing Steel (AASHTO B, 5.4.4)

$M_u = \phi M_n = \phi A_s f_y (d - a/2) = 0.9(.62)(40)(6.69 - \frac{.81}{2}) = 140 K\text{-in}$ (AASHTO B, 5.5.3.1) $= 11.7 K\text{-ft}$

$a = \frac{A_s f_y}{.85 f'_c b} = \frac{.62(40)}{.85(3)(12)} = 0.81$

$d = 8\frac{1}{2}" - 1\frac{1}{2}" - \frac{5}{16}" = 6.69"$ avg.

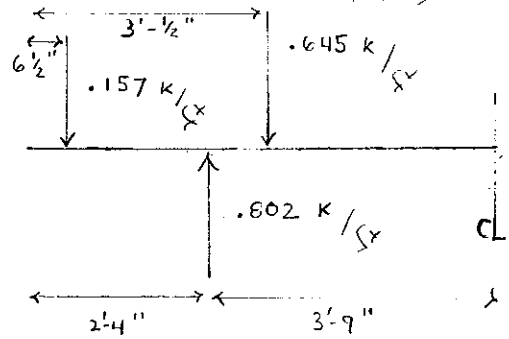
Dead Load, DL $= \frac{8\frac{1}{2}"}{12} \times 1' \times 150\ lb/ft^3 = .106\ K/ft$

Deck $12.17'\ (.106\ K/ft) = 0.645\ K$

Curb $(1')\ 13\frac{1}{2}"\left(\frac{10"}{12}\right)^2 150\ \frac{lb}{ft^3} = 0.141\ K$

Rail $.1\ ft^3\ (165\ lb/ft^3) = 0.016\ K$

$0.802\ K/ft$ ℄



$S = 7.5' - 1' + 9" = 7.25'$

$M_{DL} = -.157(5.54') - .645(3.04') + .802(3.75) = .196\ ft\text{-}K/ft$

center line (pos.) M_{LL} (AASHTO 3.24.3.1 A, HS-20) $= \left(\frac{S+2}{32}\right) P_{80} = \left(\frac{7.25+2}{32}\right) 16{,}000\ lb = 4.625 K$

support (neg.) $M_{DL} = -.157\left(2.33' - \frac{6.5"}{12}\right) - .106(2.33')\left(\frac{2.33'}{2}\right) = .568\ ft\text{-}K/ft$ ✓

$d_{support} = 6.19$ in $\quad d_{CL} = 7.19$ in

SUBJECT W. Thompson Service Bridge
COMPUTATION Bridge Rating Analysis
COMPUTED BY L.B. CHECKED BY JWK DATE 11/15/95

Girder Rating (cont.)

Girder Dead Load

	Wt (lb/ft)
Girder, 36WF160	160
Deck $\frac{1}{2}(12'\text{-}2'') \times \frac{8\frac{1}{2}''}{12''/ft} \times 150\frac{lb}{ft^3}$	646

Diaphragm (3@12'), 18C42.7
$3 \times 42.7\frac{lb}{ft} \times 3'\text{-}9'' = 480.4$ lb

Diaphragm (2@ ends), 15C33.9
$2 \times 33.9\frac{lb}{ft} \times 3'9'' = 254.2$ lb

Stiffeners (5), 22" × 9" × ½"
$.42\ cf \times 490\frac{lb}{cf} = 205.8$ lb

940.4 lb

* distribute load (assume) over 60' span → 15

821 lb/ft

$M_{DL} = \frac{wl^2}{8} = \frac{821 \cdot (60ft)^2}{8} = 369.4$ K-ft

Girder Superimposed Dead Load

	Wt (lb/ft)
Curb and Rail	157

$M_{SDL} = \frac{wl^2}{8} = \frac{157 \cdot (60ft)^2}{8} = 70.6$ K-ft

Fuel Tank (pg. 4) — fuel tank removed

$M_{SDL} = 12.0$ K-ft / 70.6 K-ft

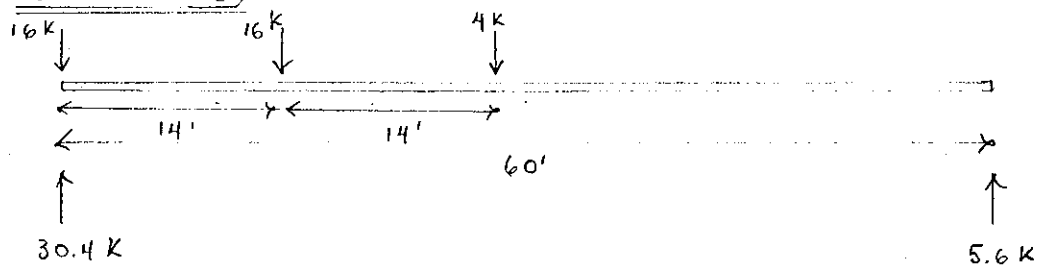
Shear $V_{DL} = .978\ K/ft \times \frac{60ft}{2} = 29.34$ K

$V_{allowable\ inventory} = 11\ ksi\ (.69\ in \times 34\ in) = 258.06$ K
(AASHTO, Table 6.6.2.1-1)

$V_{allow.\ operating} = 15\ (.69 \times 34) = 351.9$ K

SUBJECT @ Thompson Service Bridge
COMPUTATION Bridge Rating Analysis
COMPUTED BY LB. CHECKED BY JJR DATE

Shear (cont.)



Rating Factor (inventory), $RF = \frac{258.66 - 29.34\ K}{30.4\ K} = 7.52$

$RF\ (operating) = \frac{351.9\ k - 29.34K}{30.4} = 10.61$

Rating for Shear, Inventory = $7.52(36T) = 270.85\ T$
, Operating = $10.61(36T) = 381.98\ T$

SUBJECT W. Thompson Service Bridge
COMPUTATION Bridge Rating Analysis
COMPUTED BY LB CHECKED BY JJR DATE 11/15/95

Deck Rating (cont.)

Operating Rating of Sections Governed by Max. Strength (AASHTO B, 5.5.1)

Max. Strength, $M_u \geq 1.3\left[D + RF(L+I)\right]$ * assume impact = 0

11.7 K-ft $\geq 1.3\left[.176 + RF(4.625 + 0)\right]$

$RF \leq 1.90$ Rating = 1.90 (36 ton) = 68.6T OPERATING

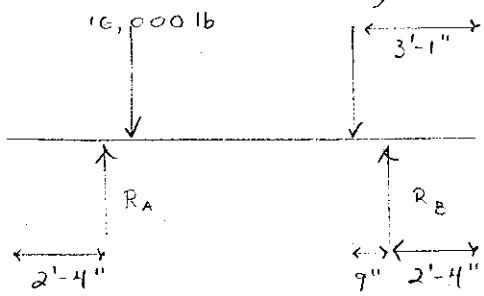
Inventory Rating

$M_u \geq 1.3\left[D + \frac{5}{3} RF(L+I)\right]$

$RF \leq 1.14$ Rating = 1.14 (36 ton) = 41.2 T INVENTORY

Girder Rating

HS20

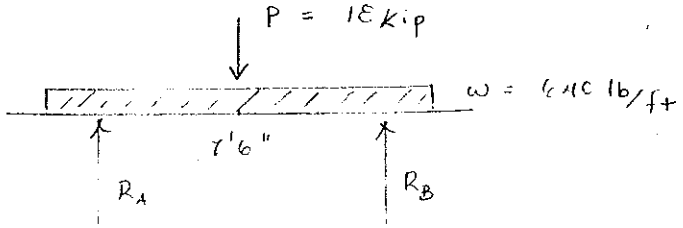


(AASHTO A, Fig. 3.7.6A)

a. Truck Load

$R_A = R_B$ = 16,000 lb (wheel load) = ω = ½ truck load

b. Lane Load



18,000 + 640 lb/ft (10ft) = 24,400 lb

R_A (7'6") = 24,400 lb (3.75') R_A = ½ lane load = 12,200 lb

* Truck Load Governs

(AASHTO A, Appendix A) Span Length = 60 ft
Moment Max = 806.5 K-ft (2 wheel lines)

Distribution Factor (Live Load)

D.F. = .5 lane load